Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) A method of detecting a location of a gas leak within a test region, the method comprising:
   (a) providing a sensor array comprising a plurality of sensors configured to measure a plurality of gas concentrations simultaneously;
   (b) measuring the plurality of gas concentrations at the same time, while maintaining a position of the sensor array;
   (c) determining a local gas concentration profile based on the measured gas concentrations;
   (d) moving the sensor array to a new location depending upon the local gas concentration profile determined in step (c); and,
   (e) repeating steps (b) to (d) until a stopping condition is achieved.

2. (Original) The method as defined in claim 1, wherein the local gas concentration profile indicates a direction of higher gas concentration.

3. (Original) The method of claim 2, wherein moving the sensor array to a new location comprises moving the sensor array in the direction of the higher gas concentration.

4. (Original) The method of claim 1, wherein determining the local gas concentration profile comprises calculating a direction of higher gas concentration according to a computer algorithm.

5 (Original) The method of claim 1, wherein determining the local gas concentration profile comprises calculating a gas concentration gradient.

6. (Original) The method of claim 1, wherein the stopping condition is achieved when one of the measured gas concentrations exceeds a threshold.

7. (Original) The method of claim 6, wherein the threshold is predetermined.

8. (Original) The method of claim 1, wherein determining a local gas concentration profile comprises comparing the measured gas concentrations to previously measured gas concentrations at other locations in the test region.

9. (Original) The method of claim 1, comprising, before determining the local gas concentration profile, moving the sensor array within the test region according to a scanning model until the measured gas concentrations exceed a minimum threshold.

10. (Currently amended) ~~The method of claim 1,~~ A method of detecting a location of a gas leak within a test region, the method comprising:

(a) providing a sensor array comprising a plurality of sensors configured to measure a plurality of gas concentrations;

(b) measuring the plurality of gas concentrations;

(c) determining a local gas concentration profile based on the measured gas concentrations;

(d) moving the sensor array to a new location depending upon the local gas concentration profile determined in step (c); and,

(e) repeating steps (b) to (d) until a stopping condition is achieved,

wherein the stopping condition is achieved when the sensor array repeatedly returns to the same location within the test region.

11. (Original) The method of claim 1, wherein the stopping condition is achieved when the sensor array measures a plurality of nearly equal high gas concentrations within a localized subregion of the test region.

12. (Original) The method of claim 1, further comprising displaying the local gas concentration profile.

13. (Currently amended) ~~The method of claim 1,~~ A method of detecting a location of a gas leak within a test region, the method comprising:

(a) providing a sensor array comprising a plurality of sensors configured to measure a plurality of gas concentrations;

(b) measuring the plurality of gas concentrations;

(c) determining a local gas concentration profile based on the measured gas concentrations;

(d) moving the sensor array to a new location depending upon the local gas concentration profile determined in step (c); and,

(e) repeating steps (b) to (d) until a stopping condition is achieved,

the method further comprising determining a global gas concentration profile based on a plurality of the local gas concentration profiles.

14. (Currently amended) ~~The method of claim 1,~~ A method of detecting a location of a gas leak within a test region, the method comprising:

(a) providing a sensor array comprising a plurality of sensors configured to measure a plurality of gas concentrations;

(b) measuring the plurality of gas concentrations;

(c) determining a local gas concentration profile based on the measured gas concentrations;

(d) moving the sensor array to a new location depending upon the local gas concentration profile determined in step (c); and,

(e) repeating steps (b) to (d) until a stopping condition is achieved,

wherein the gas is hydrogen.

15. (Currently amended) ~~The method of claim 1,~~ A method of detecting a location of a gas leak within a test region, the method comprising:

(a) providing a sensor array comprising a plurality of sensors configured to measure a plurality of gas concentrations;

(b) measuring the plurality of gas concentrations;

(c) determining a local gas concentration profile based on the measured gas concentrations;

(d) moving the sensor array to a new location depending upon the local gas concentration profile determined in step (c); and,

(e) repeating steps (b) to (d) until a stopping condition is achieved,

wherein the test region is a fuel cell.

16. (Currently amended) A method of detecting a location of a gas leak within a test region, the method comprising:

(a) providing a sensor array comprising a plurality of sensors configured to measure a plurality of gas concentrations simultaneously;
(b) moving the sensor array within the test region according to a scanning model until the presence of a gas leak is detected;
(c) simultaneously measuring the plurality of gas concentrations at a current location to determine a local gas concentration profile;
(d) calculating a direction of higher gas concentration based on the local gas concentration profile;
(e) moving the sensor array in the calculated direction ~~of the higher gas concentration~~; and,
(f) repeating steps (d) and (e) until the sensor is positioned proximate the location of the highest gas concentration within the test region.

17. (Currently amended) Apparatus for detecting a location of a gas leak within a test region, the apparatus comprising:
(a) a sensor array comprising a plurality of spaced-apart sensors configured to measure a plurality of gas concentrations simultaneously;
(b) a control system operatively coupled to the sensor array for determining a local gas concentration profile based on the simultaneously measured gas concentrations; and,
(c) an actuator controlled by the control system for moving the sensor array toward the highest concentration of the gas within the test region until a stopping condition is achieved.

18. (Original) The apparatus of claim 17, wherein the control system comprises a display for displaying the local gas concentration profile.

19. (Original) The apparatus of claim 17, wherein the control system comprises a microprocessor.

20. (Original) The apparatus of claim 19, wherein the microprocessor is configured to calculate a gas concentration gradient.

21. (Original) The apparatus of claim 17 wherein the sensors comprise calibrated semiconductor sensors.

22. (Original) The apparatus of claim 21, wherein the sensors comprise MOS capacitors.

23. (Currently amended) ~~The apparatus of claim 17,~~ Apparatus for detecting a location of a gas leak within a test region, the apparatus comprising:

(a) a sensor array comprising a plurality of spaced-apart sensors configured to measure a plurality of gas concentrations;

(b) a control system operatively coupled to the sensor array for determining a local gas concentration profile based on the measured gas concentrations; and,

(c) an actuator controlled by the control system for moving the sensor array toward the highest concentration of the gas within the test region until a stopping condition is achieved,

wherein the actuator comprises a sensor positioning system movable in one, two or three dimensions within the test region.

24. (Currently amended) ~~The apparatus of claim 17,~~ Apparatus for detecting a location of a gas leak within a test region, the apparatus comprising:

(a) a sensor array comprising a plurality of spaced-apart sensors configured to measure a plurality of gas concentrations;

(b) a control system operatively coupled to the sensor array for determining a local gas concentration profile based on the measured gas concentrations; and,

(c) an actuator controlled by the control system for moving the sensor array toward the highest concentration of the gas within the test region until a stopping condition is achieved,

wherein the actuator comprises a three degree of freedom prismatic robot.

25. (Original) The apparatus of claim 17, wherein the control system comprises a comparator for comparing the measured gas concentrations to at least one gas concentration set point stored in memory.

26. (New) Apparatus for detecting a location of a gas leak within a test region, the apparatus comprising a sensor array comprising a plurality of spaced-apart sensors configured to measure a plurality of gas concentrations simultaneously, and to generate a local gas concentration profile.